

What is claimed is:

1. An axle unit for wheel-drive comprising an outer race having an outside end and being not rotatable even during use, a hub having an outside end and inside end and a portion that protrudes outward from the outside end of the outer race toward the outside, a drive member having an outside end and inside end, a coupling member and a plurality of rolling bodies, the axle unit being combined with a constant-velocity joint,

the outer race having an inner peripheral surface formed with an outer-ring raceway thereon,

the hub having an outer peripheral surface formed with an installation flange for supporting the wheel near the outside end thereof, and with an inner-ring raceway that is formed near the inside end thereof directly on the hub or by way of an inner race, such that the inner-ring raceway faces the outer-ring raceway, and a first fitting peripheral surface formed with a first spline section,

the drive member having a second fitting peripheral surface formed with a second spline section at the outside end thereof such that the second spline section is engaged with the first spline section, and with a housing section formed at the inside end thereof such that the housing section forms an outer ring of the constant velocity joint, the rolling bodies being rotatably located

between the outer-ring raceway and inner-ring raceway,
the hub having a first engagement section formed on a peripheral surface
thereof,
the drive member having a second engagement section formed on a
peripheral surface thereof,
the coupling member being adapted to freely deform elastically in the
radial direction and located between and engaged with the first engagement
section and the second engagement section so as to position the hub and drive
member in the axial direction,
the first spline section being engaged with the second spline section to
form a spline connection having a pitch circle wherein the clearance width in
the circumferential direction on the pitch circle is controlled within the range of
0.001 mm to 0.10 mm.

2. A drive unit for wheel comprising a rolling-bearing unit for supporting a
wheel, a constant-velocity joint unit and a coupling member, to be connected to
a differential gear having an output section,

the constant-velocity joint unit comprising a first constant-velocity joint
having an output section and input section, the input section being connected to
the output section of the differential gear, a transmission shaft having an output
end and input end, the input end of the transmission shaft being connected to

the output section of the first constant-velocity joint, and a second constant-velocity joint having an input section connected to the output end of the transmission shaft,

the rolling-bearing unit for supporting the wheel comprising an outer race having an outside end and being not rotatable even during use, a hub having an inside end and outside end and a plurality of rolling bodies,

the outer race having an inner peripheral surface formed with an outer-ring raceway thereon,

the hub having an outer peripheral surface and comprising an installation flange for supporting the wheel, the installation flange being formed on the outer peripheral surface of the hub near the outside end on a portion that protrudes outward from the outside end of the outer race toward the outside, an inner-ring raceway that is formed near the inside end of the hub directly on the hub or by way of an inner race, such that the inner-ring raceway faces the outer-ring raceway, and a first fitting peripheral surface formed with a first spline section,

the rolling bodies being rotatably located between the outer-ring raceway and inner-ring raceway,

the second constant-velocity joint comprising a second fitting peripheral surface located at an outside end thereof where the second spline section is

engaged with the first spline section through a spline connection, and a housing section formed on an inside end thereof so as to function as an outer ring of the second constant-velocity joint,

the coupling member being adapted to deform elastically in the radial direction and located between and engaged with the first engagement section formed on the peripheral surface of the hub and the second engagement section formed on the peripheral surface of the second constant-velocity joint so as to position the hub and second constant-velocity joint in the axial direction, wherein the clearance angle of the spline connection between the first and second spline sections engaged with each other is regulated in the range of 0.2 minutes to 26 minutes.

3. A drive unit for wheel comprising a rolling-bearing unit for supporting a wheel, a constant-velocity joint unit and a coupling member, to be connected to a differential gear having an output section,

the constant-velocity joint unit comprising a first constant-velocity joint having an output section and input section, the input section being connected to the output section of the differential gear, a transmission shaft having an output end and input end, the input end of the transmission shaft being connected to the output section of the first constant-velocity joint, and a second constant-velocity joint having an input section connected to the output end of the

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transmission shaft,

the rolling-bearing unit for supporting the wheel comprising an outer race having an outside end and being not rotatable even during use, a hub having an inside end and outside end and a plurality of rolling bodies, the outer race having an inner peripheral surface formed with an outer-ring raceway thereon,

the hub having an outer peripheral surface and comprising an installation flange for supporting the wheel, the installation flange being formed on the outer peripheral surface of the hub near the outside end on a portion that protrudes outward from the outside end of the outer race toward the outside, an inner-ring raceway that is formed near the inside end of the hub directly on the hub or by way of an inner race, such that the inner-ring raceway faces the outer-ring raceway, and a first fitting peripheral surface formed with a first spline section,

the rolling bodies being rotatably located between the outer-ring raceway and inner-ring raceway,

the second constant-velocity joint comprising a second fitting peripheral surface located at an outside end thereof where the second spline section is engaged with the first spline section through a spline connection, and a housing section formed on an inside end thereof so as to function as an outer ring of the second constant-velocity joint,

the coupling member being adapted to deform elastically in the radial direction and located between and engaged with the first engagement section formed on the peripheral surface of the hub and the second engagement section formed on the peripheral surface of the second constant-velocity joint so as to position the hub and second constant-velocity joint in the axial direction, wherein the clearance angle of the spline connection between the first and second spline sections engaged with each other is regulated in the range of 0.2 minutes to 42 minutes.

4. A drive unit for wheel comprising a rolling-bearing unit for supporting a wheel, a constant-velocity joint unit and a coupling member, to be connected to a differential gear having an output section,

the constant-velocity joint unit comprising a first constant-velocity joint having an output section and input section, the input section being connected to the output section of the differential gear, a transmission shaft having an output end and input end, the input end of the transmission shaft being connected to the output section of the first constant-velocity joint, and a second constant-velocity joint having an input section connected to the output end of the transmission shaft,

the rolling-bearing unit for supporting the wheel comprising an outer race having an outside end and being not rotatable even during use, a hub having an

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inside end and outside end and a plurality of rolling bodies, the outer race having an inner peripheral surface formed with an outer-ring raceway thereon, the hub having an outer peripheral surface and comprising an installation flange for supporting the wheel, the installation flange being formed on the outer peripheral surface of the hub near the outside end on a portion that protrudes outward from the outside end of the outer race toward the outside, an inner-ring raceway that is formed near the inside end of the hub directly on the hub or by way of an inner race, such that the inner-ring raceway faces the outer-ring raceway, and a first fitting peripheral surface formed with a first spline section,

the rolling bodies being rotatably located between the outer-ring raceway and inner-ring raceway,

the second constant-velocity joint comprising a second fitting peripheral surface located at an outside end thereof where the second spline section is engaged with the first spline section through a spline connection, and a housing section formed on an inside end thereof so as to function as an outer ring of the second constant-velocity joint,

one of the first and second spline sections being formed on the inner peripheral surface and having spline teeth which are formed parallel with the center axis of the hub and second constant-velocity joint, and one of the first

and second spline sections being formed on the outer peripheral surface and having spline teeth which are an inclined spline slightly inclined with respect to the direction of the center axis of the hub and second constant-velocity joint,

the coupling member being adapted to deform elastically in the radial direction and located between and engaged with the first engagement section formed on the peripheral surface of the hub and the second engagement section formed on the peripheral surface of the second constant-velocity joint so as to position the hub and second constant-velocity joint in the axial direction, wherein the clearance angle of the spline connection between the first and second spline sections engaged with each other is regulated in the range of -17 minutes to 42 minutes.

5. The drive unit for wheel of one of Claims 2 to 4, wherein the first spline section is formed in a female spline and provided on the inner peripheral surface of the hub while the second spline section is formed in a male spline and provided to form an outside end of the second constant velocity joint, and wherein the first engagement section is a radially outer engagement section and provided on the inner peripheral surface of the hub at a portion closer to the outside end thereof while the second engagement section is a radially inner engagement section and provided on the outer peripheral surface of the spline shaft at a portion closer to the outside end thereof.

6. The drive unit for wheel of one of Claims 2 to 4, wherein a spacer is fitted and fixed onto the inside end of the hub and retained by a crimped portion, and formed integral with or separated from the inner ring, and has an outer peripheral surface, and wherein the second constant velocity joint comprises a housing section having an inner peripheral surface at the outside end thereof, and formed in a generally substantially cylindrical shape, and wherein the first spline section is provided on the outer peripheral surface of the spacer and formed in a male spline, while the second spline section is provided on the inner peripheral surface of the housing section at the outside end thereof and formed in a female spline, and wherein the first engagement section is a radially inner engagement section and provided on the outer peripheral surface of the spacer while the second engagement section is a radially outer engagement section and provided on the inner peripheral surface of the drive member at the outside end thereof.

7. The drive unit for wheel of one of Claims 2 to 6, wherein at least one of the transmission shaft and the second constant velocity joint including the housing section has an outer peripheral surface formed with an engagement portion, so that when the second constant velocity joint is spline-connected to a rolling bearing unit for supporting a wheel, at least one of the transmission shaft and the second constant velocity is engaged with a robot arm to prevent the robot

arm from being axially displaced with reference to the at least one of the transmission shaft and the second constant velocity joint.

8. A method of assembling a drive unit for wheel of Claim 7, comprising the steps of grasping an engagement portion formed on the outer peripheral surface of the at least one of the transmission shaft and the second constant-velocity joint, supporting the rolling bearing unit for drive wheel so as not to be displaced in the retracting direction following the displacement of the robot arm, and then in this state displacing the robot arm, and making the second constant-velocity joint engaged with the rolling bearing unit for supporting the wheel through spline connection.

9. The method of assembling the drive unit for wheel of claim 8 wherein in the state where the second constant velocity joint is engaged with the rolling bearing unit for supporting the wheel through spline connection, coupling the second constant velocity joint to the rolling bearing unit for wheel support with a coupling member based on the elastic deformation thereof, and then using the robot arm to apply a force smaller than the strength of the coupling member in the direction to separate the second constant-velocity joint from the rolling bearing unit for wheel support, so as to check whether the coupling with the coupling member is securely conducted.